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**From the Pulps to the Stars: The Making of the
American Science Fiction Magazine, 1923-1973**

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Abstract: Making a theoretical case linking genre trajectory with artistic legitimation struggles, this paper seeks to explain the development of the American science fiction magazine. Across the fifty-plus years analyzed, science fiction emerged from its lowbrow pulp fiction origins into a highly successful, critically acclaimed genre across multiple mediums. This empirical trend is then modeled using predictors adopted from theories of cultural legitimation, which conceptualize the process as both movement induced and historically shaped. Employing standard time-series regression techniques, the results suggest a sequential story underlying the trajectory of American science fiction magazines: popular science initially created a legitimate discursive space for the nascent genre, while growing cohesive networks among science fiction authors sustained the cultural form in the post-war period. The paper, then, contributes significantly to the growing study of the dynamics of classificatory schemes.

Keywords: genre trajectory, cultural legitimation, science fiction, popular science, historical sociology, social movements

I mean the Jules Verne, H. G. Wells, and Edgar Allan Poe type of story—a charming romance intermingled with scientific fact and prophetic vision.

--Hugo Gernsback (1926) on defining “scientifiction”

I know people say things like, “I regard you as rather a prophet.” But there’s nothing I’ve said that hasn’t been, for example, in the *New Scientist* for the last twenty years. Nothing! So why am I called a prophet and they are not?

--Doris Lessing (1988) on writing “science fiction”

Within cultural markets, genres represent the premier system of classification—the meaningful yardstick against which artistic works (books, movies, art, etc) are measured and made understandable. As taken-for-granted categories, genres orient the expectations of both producers and consumers in the production/reception process through a set of readymade metaphors, idioms, and conventions (Griswold, 1987). Substantial empirical work on the production side has identified across a range of domains (especially in film, see Hsu, 2006) the costs and benefits associated with situating a work with a particular genre or genres. On the consumption side, studies on the cultural stratification of taste have demonstrated that different genres attract and exclude different kinds of consumers, reproducing wider social inequalities within particular cultural domains (Bourdieu, 1993). As sociologists have come to terms with how such stable systems of “ritual classification” shape cultural perceptions and productions, we still lack a dynamic theory of classificatory schemes per se, as DiMaggio (1987: 441) lamented over twenty years ago and Lena and

Peterson (2008) recently reaffirmed. In short, how do new cultural forms emerge and develop over time?

Collecting original data on American science fiction magazines through their emergence and institutionalization, I identify and seek to explain the genre trajectory of science fiction over fifty-plus years (1923-1973). Emerging first out the undifferentiated lowbrow pulp fiction market, science fiction attained both wide popularity and critical acclaim by mid-century. While the genre exists now across a range of mediums (books, film, TV), science fiction was primarily consumed during this period in serialized form. I make a theoretical case linking genre trajectory to a more general process of artistic legitimization. Looking to recent work in the sociology of culture (Baumann, 2007, Isaac, 2009), I argue that artistic legitimacy is commonly generated through a process of collective action akin to social movements. Thus, the wider legitimacy of science fiction magazines and ensuing genre trajectory can be explained through the conjuncture of internal movement-induced processes and external, mediating conditions. Subsequent hypotheses are then tested using standard time-series regression techniques. In particular, I demonstrate that science fiction's trajectory was the joint result of 1) the legitimating ideology of popular science, 2) changing competitive dynamics within lowbrow fiction market and 3) a growing network of authors. These processes appear to have influenced the genre in a particular sequence detailed below and, moreover, remain robust to alternative explanations derived from population ecology and the production of culture perspectives, which focus on similar processes of legitimacy and competition within cultural markets.

The results suggest three accomplishments. First, I advance the growing literature on the dynamics of classificatory schemes, identifying concretely a set of general processes that can be adapted in other contexts to help explain particular genre trajectories. Second, the results demonstrate the profitability of situating genre dynamics on the boundaries of purposefully overlapping cultural fields (see, more generally, Evans and Kay, 2008)—in this case, I explore the relationship between science fiction and popular science. Third, despite considerable work on newspapers, films, and books, few sociologists have examined magazines as a sociological object of interest per se, as I do here (see Haveman, 2004, for an important exception).

1. Genres in Context

Artistic genres embody sets of “orientations, expectations and conventions that bind together an industry, performers, critics, and fans in making what they identify as a distinctive sort of [cultural good]” (Lena and Peterson, 2008: 698). Within multiple cultural domains like literature, food, music, and cinema, genres serve the primary system of classification. Genres, as such, become social organizational devices for coordinating the collective actions of artistic producers and consumers alike (DiMaggio, 1987; Griswold, 1987; see also Hsu and Hannan, 2005). They are enacted in practice through the on-going classification of art works on the basis of perceived similarities and differences. Such categories make different goods commensurable, facilitating exchange on open markets (Khair and Wadhwani, 2010). What particular organizing principles and cultural resources cohere into a recognizable genre is a matter of on-going boundary work, leading sometimes to intense and prolonged aesthetic conflict. Studying this boundary making-in-process can be useful, as Becker (2008 [1982]: 36) writes, “Art worlds typically devote

considerable attention to trying to decide what is and isn't art, what is and isn't their kind of art, and who is and isn't an artist; by observing how an art world makes those distinctions rather than trying to make them ourselves we can understand much of what goes in that world." As many sociologists have observed, this boundary work is not limited to producers, as particular external audiences such as critics, consumer advocates, or fans often perform an equally important role in recognizing and reinforcing a producer's genre affiliation (Hsu and Hannan, 2005). Thus, departing from common humanistic approaches, sociologists suggest that artistic distinctions are embedded not only in the content of a work, but also in the practical activities of groups in the pursuit of opportunities, authority, and authenticity (Bourdieu, 1993; Gerhards and Anheier, 1989; Hsu, 2006; Peterson, 1997).

While the "genre" concept has received increasing attention in sociology, much empirical work, however, continues to view genres as static categories rather than problematized, socio-cultural constructs, which can shift radically overtime.¹ That genres grow and decline, differentiate and disappear is empirically incontrovertible; why they do so remains unclear given current sociological understanding. Only recently have scholars turned their attention to the question of genre emergence and development, looking to the categories themselves as the unit of analysis (Isaac, 2009 on the labor problem novel; Khaire and Wadwhani, 2010 for modern Indian art; Lena and Peterson, 2008 on popular musical genres). Though numerous case studies abound, little exists in the way of an explicit theory of category emergence and development, especially within cultural field

¹ The persistence of this static view of genres reflects both the largely individually centered nature of much genre/taste research and the realities of quantitative methods in which genre preferences of consumers illuminated through surveys get coded simply as a dummy indicator.

such as music or literature. It is my contention here that social movement research offers some analytical purchase on the matter. In economic and organizational sociology, new work inspired by decades of collective action research explores how social movements, inside and outside organizations, help generate new markets, organizational forms, and associated categories (Rao et al, 2003; Rao, 2009; Schneiberg et al, 2008; Weber et al, 2008). Arguably, many art worlds or cultural fields assume, as well, a social movement-like character in the creation of new artistic forms. As Bauman (2007) argues, artistic legitimacy for new artistic forms is won, not merely accumulated, through on-going collective action by art world participants. An “art world” or “cultural field” comprises the bounded set of relations between producers and consumers around particular symbolic goods (Becker, 2008 [1982]; Bourdieu, 1993). In Bourdieu’s formulation, all fields are arenas of struggle where unequal distributions of resources drive ongoing conflict over the means and modes of cultural reproduction (1993). Every field strives to accumulate a distinctive form of capital and the artistic field is no different: “the characteristic of art in general, and of literature in particular, is its preoccupation not with competition for material goods, political power, educational titles, scientific reputation, or athletic success, but rather with cultural legitimation” (Gerhards and Anheier, 1989: 131). Thus, members of a cultural field struggle primarily over both aesthetic boundaries and public acceptance or legitimacy thereof—it is not enough to have a private definition of a particular cultural good, artists desire above all else external recognition of their labor.

If we grant that agents within cultural fields primarily seek wider legitimacy for their works and associated categories, we can begin to sketch a rough theory of how cultural categories like genres develop through time. Examining the legitimation of film as

art beyond popular entertainment, Baumann (2001) identifies three overlapping processes derived from social movement research behind film's highly contested valorization—I refer to this framework subsequently as the three-fold social movements model. The first is a “changing opportunity space” for a particular cultural good. Baumann (2001: 407) defines an opportunity space as “the existence of competing or substitute cultural products and the availability of patrons who can bolster a cultural product's prestige.” For film, increasing college enrollment led to more educated consumers able to appreciate the artistic qualities of film, while television, as a rival good, largely absorbed the lower class audiences that comprised the majority of early 20th century filmgoers. Such processes center explanations of cultural change in the external competitive environment. Second, Bauman highlights the “institutionalization of resources and practices of production and reception” within a particular field. This happens through on-going construction of organizing principle that determines how a cultural work is made and interpreted. These processes can take on a variety of forms; for example: the creation of formalized training schools as in the case of art schools, public contests like film festivals, or external rating systems (e.g. Michelin stars in *haute cuisine* or IMDB user ratings for movies). Again for film, the emergence of both film festivals and the conception of the movie director as more *auteur* than set manager helped shore up its growing highbrow status. Third, Baumann suggests that genres and their artistic worth must be grounded in a “legitimizing ideology”. Artists and their works, Baumann argues, primarily acquire this newfound worth through critical discourse generated by a specialized set of legitimate cultural agents, i.e. critics. Through content analysis of film criticism, Baumann found that critics, especially in the post-1960 period, took on a greater interpretative role in assessing film quality and actively linked cinema to

other high art forms. More generally, social movement research has highlighted how enterprising actors employ external “codes” or “frames” borrowed from other contexts to legitimate the creation of new markets, movements, or categories (Benford and Snow, 2000, see also Frickel and Gross, 2005, Isaac, 2009, Weber et al., 2008). In perhaps the most thorough empirical analysis of a single sub-genre trajectory, Isaac (2009), for example, makes the case linking the production of early 20th century labor problem novel to outside fields of collective labor contention and labor movements. As Isaac demonstrates, the greater proliferation of labor unions and, by association, increasing numbers of organized strikes around the turn of the 20th century helped create a legitimate discursive space for the new sub-genre, which represented the growing labor problems and poor working conditions of the day in fictional form. The connection is not simply one-to-one, but rather mediated through a highly institutionalized cultural field like fiction writing. As Isaac argues, conventions of literary realism needed to be in place before this cross-field transfer of legitimacy could happen.

The empirical contribution of the paper looks to these three processes (opportunity space, institutionalized resources, and legitimating ideology) to model the genre trajectory of science fiction. Such an approach constitutes a theoretical improvement over previous attempts like Isaac (2009) that gesture towards important internal and external genre dynamics, but fail to elaborate a more consistent set of general processes applicable elsewhere. The general nature of these processes requires some finesse in drawing out hypotheses and selecting relevant measures; such generality, however, can only aid the further development and refinement of consistent, albeit historically specific, theoretical framework for explaining this and other genre trajectories. As a word of theoretical

caution, my approach works on the assumption that genre trajectories are themselves a function of wider legitimacy—a claim I return to in the conclusion.

2. The trajectory of science fiction magazines, 1923-1973

I am concerned with explaining the trajectory of science fiction. But first what exactly do we mean by science fiction? Science fiction (hereafter: SF) is difficult to characterize across its varied history despite the claim it is “characteristic literary mode of late modernity, the defining genre of our age” (Milburn, 2010: 560). Different authors, critics, and fans have identified science fiction alternatively as the literature of “change”, “the future”, “cognitive estrangement” or “technological imagination” (Landon, 2002). Few definitions exhaust the sheer variety of stories, tropes, and forms that comprise SF. As an indicator of this definitional uncertainty, a popular research guide (Tymn, 1981: 496-511) lists over sixty-eight definitions of science fiction alone! Acclaimed SF writer Ursula Le Guin has gone so far to suggest that the genre’s very “non-definability” may be one of its essential qualities (quoted in Landon, 2002: 32). Thinking historically, we can remain somewhat agnostic over *what* exactly defines science fiction, as shifting definitions reflect the very social processes of interest that shaped the genre. To help lend some conceptual clarity to the task at hand, I mark a distinction between “science fiction” in general and “genre science fiction” in particular, keeping with conventions in the literary criticism of the genre. The former constitutes the vast territory of experiences, attitudes, and idioms associated with the genre, extending well beyond individual works into the wider social milieu, while the latter represents the literary category itself, as self-consciously represented in particular works (Landon, 2002). In short, genre science fiction is “sf...either labeled science fiction or instantly recognized by its readership as belonging to that category—usually both”

(Clute and Nichols, 1999: 483). An emphasis on the category, “science fiction”, facilitates both easier measurement and data collection and allows us to pinpoint particular eventful moments like the coinage of the term and its wide-scale adoption.

Contemporary critics and historians commonly locate genre science fiction’s origins in the “scientific romances” of the mid to late 19th century, pioneered first in America by Edgar Allan Poe, then translated and transformed in France by Jules Verne, finally crossing the channel in the works of H.G. Wells (Attenbery, 2003). These early scientific romances embodied and embraced a rationalist view of the world, going to sometimes-pedantic lengths to proffer reasoned explanations for the seemingly fantastic or supernatural. In time, exacting attention to new technologies and their social consequences merged with a growing concern to prophesize about the future, envisioning utopias and dystopias as the result of broad social and technical transformations (see Kiser and Drass, 1987).

Concurrent with this new brand of rationalist, highbrow fiction (mainly in Europe and England), new lowbrow literary forms were also emerging in the United States that emphasized adventure, mystery, and the exotic—detective stories, westerns, and jungle adventures all became mainstays in this period. Though there are important exceptions, these early stories were published and consumed primarily in serialized form by a rapidly expanding literary public hungry for genre fiction. As literary historian Brian Stableford argues, the unique industry structure of American magazine publishing after World War I created an unusually rich breeding ground for new literary fiction genres:

In the United States there emerged a sharp division between the advertising-supported “slick magazines” and the sales-supported pulps. The latter underwent a dramatic diversification, experimenting with dozens of new types in the hope of

discovering new “ecological niches” within the ragged spectrum of lowbrow literary taste. Science fiction was one of the few experiments that succeeded—in the sense of finding, holding, and gradually expanding an audience of specialist readers—because it was a species of fiction appealing mainly to young male readers (1995: 65).

The so-called “pulp” were identified by their cheap “pulp” paper, as opposed to the glossy coated, more expensive “slick” magazines—in passing, the distinction between the forms hewed somewhat to present notions of lowbrow versus highbrow culture. The first genre fiction pulp was Frank Munsey’s *Argosy*, which debuted in 1883 and was revamped into an all fiction magazine in 1896. The next decade saw the debut of other such pulp magazines like Street & Smith’s *Popular Magazine* (1903) dedicated to “fiction for the common man” and another Munsey publication, *All-Story Magazine* (1905), which introduced readers to the works of proto-SF author Edgar Rice Burroughs. In the pages of these early pulps, tawdry adventure tales ranged across multiple genres, promising lurid violence and steamy romance as evidenced by the often risqué magazine cover art. Writers were paid by the word and it showed; successful writers were those who could produce many stories, not necessarily quality ones.

Genre SF emerged concretely in the United States first in pages of such pulp magazines. For at least the first fifty years of genre science fiction, often referred to as the “magazine era” in SF, the locus of the genre was squarely in magazines like *Amazing Stories* (1926-2005) or *Astounding Science-Fiction* (1930-) before it shifted to other literary forms—paperback books—and different mediums all together like film and television. Such magazines were “the primary driving force in the generation of science fiction”

despite the fact that “the SF magazine is largely unknown to the vast science fiction market that the magazines helped create” (Ashley, 2005).

For this paper, I collected systematic data on American science fiction magazines from 1923 to 1973, relying upon fan-generated indices and histories (see appendix A for more details) to guide selection procedures. Though science fiction could be found in a variety of periodicals, my dataset is restricted to magazines that solely published this and other closely related genres. In total, the dataset includes 168 magazines complete with information on foundings, dissolutions, publishing houses, editors, stories, and authors. Similar procedures were used to collect data on crime fiction magazines and western magazines, two lowbrow rival genres, for comparison purposes. The start date of 1923 corresponds to both the debut of the first SF magazine considered here, *Weird Tales*, and the coinage of “scientific fiction” by editor Hugo Gernsback. The end date of 1973 is more arbitrary, but reflects a transition in the SF magazine market—by the early 1970s, small presses with limited circulation and paperback fiction houses began introducing their own magazines and anthologies. The SF magazine then faded from mass consumption, as the genre expanded in other mediums.

Fig 1 and 2 about here.

Figure 1 shows a time-series graph of relevant population measures of science fiction magazines, including the total number of magazines active in a given year (density), foundings, and dissolutions. The cyclical pattern in SF magazine density with local maximums in 1940, 1953, and 1970 is unique given the typical trajectory of most organizational forms and even other fiction magazines. Figure 2 compares the density of science fiction magazines with that of crime fiction and western magazines. In both cases,

crime fiction and westerns follow a more ideal-typical trajectory rising quickly in popularity, achieving stability at some upper limit, and then declining over time. Though there are some noticeable shared fluctuations in all three genres, especially in and around World War II (1941-1945) as paper shortages affected many periodicals, science fiction appears to stand apart from its rival lowbrow counterparts in terms of its historical trajectory.

My dependent variable of interest—the genre trajectory of science fiction—is measured using foundings of new science fiction magazines. The choice reflects both Isaac’s (2009: 950) use of the annual count of new labor problem novels as his measure of genre trajectory and the established tradition of population ecology research on founding rates of organizations (Hannan and Freeman, 1987). My primary predictors of interest are adopted from Baumann’s three-fold social movements model specified in detail below. Additionally to lend robustness to the results, I advance alternative explanations derived from both population ecology and the production-of-culture perspective.

2.1. Legitimizing Ideology

Perhaps the most pressing issue in the history and criticism of science fiction explores the relationship between science and science fiction. Considerable historical and critical work has demonstrated an intimate and on-going relationship between the two cultural fields (Millburn 2010). From a popular science angle, recent histories have demonstrated the impressive knowledge and foresight of early science fiction authors, borrowing liberally from the latest science of their day. Similarly, histories of rocketry, nanotechnology, and the Internet have documented the transfer of SF concepts into actual science and emerging technologies. This two-way relationship historically, I argue, fostered a form of cross-field

legitimacy, popularizing science on one hand, while boosting the acceptance of science fiction on the other.

For genre science fiction, this connection was forged from the outset during a time of tremendous scientific and technological enthusiasm, especially in the United States. Though the genre assumed many different names in the late 19th century (“scientific romances”, “voyage extraordinaire”, etc), the term, “scientific fiction”, emerged first in a magazine dedicated to popular science, not pulp fiction. In August of 1923, magazine entrepreneur Hugo Gernsback devoted an entire issue of *Science & Invention* to “Scientific Fiction” or more awkwardly, “scientifiction” (his preferred term until he lost the rights to it upon bankruptcy in 1929, which led to him coining “science-fiction”). Though other magazines had published similar stories, Gernsback purposefully linked science fiction with popular science in a bid to differentiate the nascent genre from the usual pulp adventure stories. Gernsback would later refine this formula with *Amazing Stories* in 1926, the first pulp magazine devoted solely to “scientifiction”. In Gernsback’s vision, science fiction merged “charming romance” with “scientific fact” and “prophetic vision”. Like early proto-SF authors H.G. Wells and Jules Verne (both of whom had several stories reprinted in early issues of *Amazing*), Gernsback saw tremendous potential in science fiction to both instruct and predict the future beyond its ability to entertain readers. As the motto for *Amazing* proudly proclaimed: “*Extravagant Fiction Today...Cold Fact Tomorrow*” (quoted in Westfahl, 1996: 8). Although such didacticism gave way quickly to scientifically implausible adventure stories, subsequent SF magazines continued to publish popular science essays alongside the usual serialized short stories. In the Letters to the Editor, one often finds not only detailed discussion of the latest short stories, but on-going debates, as

well, over the scientific merit of said stories. Over time, both reading and writing science fiction began to require some form of basic scientific literacy in addition to a strong willingness to suspend disbelief. From the late 1930s to early 1950s, literary conventions within the genre favored “quieter, more thoughtful stories, in which the science was realistic, and [...] scientists, inventors, and engineers talked and acted like recognizable human beings” (Asimov, 1979: 231). Known as the *Golden Age of Science Fiction* by fans and historians, the period cemented the core values of the genre—many of SF’s enduring authors (Isaac Asimov, Arthur C. Clarke, Robert Heinlein, A.E. van Vogt, L. Ron Hubbard) emerged in this period, as well.

In the wake of the Atomic Bomb over Hiroshima and Nagasaki, an increasingly vociferous group of writers and fans argued that the now decades-old SF magazine enforced through editorial control a particular vision of science fiction out of sync with the changing times. Whereas much of early SF took on a triumphalist tone about scientific and technical progress, many writers directly questioned the cultural authority of science in their stories. In a content analysis of science fiction short stories, Hirsch (1958) found that the percentage of both physical scientist heroes and scientific solutions to social problems had declined since mid-1930s and moreover, that this decline had accelerated in the post-War period. Upset with the status quo of science fiction, a small contingent of new upstarts and some more established figures cohered into a recognizable literary movement by the late 1960s. Known commonly as the “New Wave” or “New Wave SF”, the movement stressed literary style over accurate science, present problems over future utopias, and most importantly, novels and anthologies over magazines. Unable to publish in the magazines of the day due to its (mildly) explicit content, SF writer Harlan Ellison

assembled the stories of his close associates into the definitive “New Wave” SF anthology, *Dangerous Visions* (1968). Summarizing this new movement while callously characterizing previous science fiction, SF writer and New Waver Robert Silverberg remarked in 1969:

The older writers who are by no means closely organized or in any general agreement among themselves, appear to stand for straightforward, direct prose style, plots that demonstrate the ability of a strong and sympathetic protagonist to surmount all obstacles, the story situations that spring from an accurate understanding of the aims and methods of science. The younger writers prefer experimental storytelling, methods that put no premium on easy clarity; they disdain standard plot formulas, regarding them as irrelevant to modern s-f; they see no reason why a story’s central character must be “strong” in a physical or moral sense, or why he must necessarily triumph over obstacles instead of being crushed by them; and they have so little interest in the aims of methods of science that they prefer to call themselves writers of “*speculative fiction*” rather than “*science fiction*” (my emphasis, quoted in Bainbridge, 1986: 86).

Thus, the genre had come full circle, questioning and finally all but expelling the core taken-for-granted association between science fiction and science at large. New Wave writers deemphasized the science in science fiction, stressing how futuristic settings and associated invocations of science were no more than “tools to help you think about the present”, granted a present “in which change itself assures there is always a range of options for actions” (Delaney, quoted in Landon, 2003: 35).

As the above history notes, we hypothesize a positive association between popular science and science fiction early on, which then decreases over time with the rise of

“speculative fiction” in the post-War period. As Carter (1980) has argued, we can observe an inflection point in the relationship between science and science fiction, as early as the period following the deployment of the atomic bomb in August of 1945 over Hiroshima.

Thus, we might expect:

Hypothesis 1a (1923-1945): *An increase in the popularity of science is positively associated with foundings of new SF magazines.*

Hypothesis 1b (1946-1973): *The popularity of science becomes decoupled from science fiction and is no longer associated with new magazine foundings.*

2.2. Institutionalized Resources

Art worlds and cultural fields are often likened to an on-going network of relationships (see especially Becker, 2008 [1982]). On one hand, the emphasis on networks reflects the social organization of the majority of artistic production, which draws upon informal relationships to accomplish work, rather than channel resources through more formalized, bureaucratic structures. The lone artist (painter, sculptor, photographer), for example, requires little more than the person to supply her materials, the dealer to sell her work, and potentially a small coterie of like-minded artists or critics to judge aesthetic appeal. Even in more industrialized settings like feature film, pop music, or for-profit theater, the residue of networks are ever present due to the project-centered, variable nature of the work (Faulkner, 1983; Faulkner and Anderson, 1987; Hesmondhalgh, 1998; Uzzi and Spiro, 2005). Such informal relationships not only constitute an important institutionalized resource in getting work done, but also facilitate the quick diffusion of new practices and understandings as tastes change and new aesthetic boundaries are formed. Connecting networks concretely to genre formation, Lena and Peterson (2008)

found, for example, that nearly two-thirds of all musical genres analyzed emerged first from small networks of like-minded avant-garde producers rather than from an industry or a musical scene.

Networks played a considerable role in shaping science fiction over time, though not surprisingly from the outset. As noted above, genre science fiction emerged squarely out of industry-based concerns rather than loose artistic networks or literary circles. As evidence, few magazine SF writers in the late 1920s and early 1930s devoted themselves solely to writing science fiction, as most were professional magazine fiction writers, publishing in any genre magazine that accepted their stories. Science fiction was initially much like jungle adventures, westerns, gangster tales, or weird fiction, simply another genre within the “ragged spectrum of lowbrow literary taste” (Stableford, 1995: 65). Looking to establish a permanent audience for the emerging genre, Gernsback sponsored the SF League in the early 1930s, the first of many fan associations within the genre, and went so far to publish the addresses of fans in their letters to the editor to foster correspondence between readers. While fandom is commonplace across many genres, few could have anticipated the results within science fiction. Organized into individual associations, the growing base of SF fans began to produce their own SF magazines (known collectively as “fanzines”), debate what counted as science fiction, and organize other fan associations into large annual conventions, drawing in participants from around the world (much of this early fan activity in the 1930s is lovingly rendered in Moskowitz, 1974). Across studies of fandom, science fiction remains the canonical case in terms of active fan involvement in shaping the genre (see for example, Jenkins, 1992). Though in total numbers, science fiction fans (as members of a fan association) have never comprised the

majority of science fiction's consumers, many of SF's most successful writers, editors, and critics of the genre started first as fans. Moreover, these fan associations and conventions brought together many authors and editors, creating recognizable literary circles (e.g. the Futurians of Brooklyn which included Damon Knight, Isaac Asimov, and Fred Pohl or the Manana Literary Society in Los Angeles comprised of Anthony Boucher, C.L. Moore and Robert Heinlein among others). The organization of the science fiction fandom constitutes perhaps one of the most striking institutionalized resources for the genre.

Fig 3 about here

For a related project, I tracked the evolution of co-authorship networks among science fiction writers from 1926-1955. Looking at ten-year slices, we observe (see Figure 3) the co-authorship network increased in both size and connectivity across the period of observation. From 1926-1955, the size of the network expanded from 93 authors to 198, while the largest weak component (the largest number of actors connected via undirected ties), a common measure of connectivity and cohesiveness, increased from only 5 in the first period to 80 in the third period—a sixteen fold increase! This growing cohesiveness reflects both the post-war boom in SF magazines (more magazines meant more co-authorship opportunities) and the entry of early SF fans with preexisting ties into the wider population of SF authors—that is, previous associations through SF fandom explain a portion of the ties between authors. Because of this observed lag in network formation contextualized above, we expect that largely unconnected networks early on should have little to no influence on foundings, while a more cohesive network subsequently should exert greater influence in the creation of new magazines. The sparseness of the network

due to the irregularity of co-authorship prevents us from annual network measures, but we can look to a proxy measure to track the effect of network creation on foundings:

Hypothesis 2a (1923-1945): *An increase in the annual co-authorship rate (the number of co-authored stories divided by the number of total stories) is not associated with foundings of SF magazines.*

Hypothesis 2b (1946-1973): *An increase in the annual co-authorship rate is positively associated with foundings of new magazines due to the increasing cohesiveness of the network.*

2.3. Opportunity Space

The opportunity space of a particular good reflects potential high status audiences and the presence (or absence) of rival, substitutable goods. Since there are no reliable data on the readership of science fiction in the period of interest, it is difficult to hypothesize how particular audiences might have affected the genre.² Thus, for my purposes here I focus primarily on two different substitutable goods: crime fiction magazines and books. Within the lowbrow fiction magazine market, crime fiction was perhaps the most popular genre of its day—numerically, crime fiction magazines dominated over other related genres (see Figure 2). Moreover, the crime fiction and science fiction remained close in the period of observation through authors and editor crossover, a similar valorization of rationality, and the liberal appropriation of crime fiction tropes in science fiction stories. Since crime fiction was already well established over a decade prior to the emergence of SF, we expect:

² One might be tempted to argue that SF fans constituted an important audience for the genre, but their endogenous origins and questionable status is at odds with the theoretical thrust of “opportunity space” in which external, high status audiences bestow outside legitimacy upon new forms.

Hypothesis 3 (1923-1973): *Crime fiction magazines competed with SF over similar lowbrow readers and therefore, foundings of new crime fiction magazines negatively influenced foundings of SF magazines.*

By the late 1940s, the fiction magazine market began to directly compete with similarly priced paperback novels and anthologies. Reflecting this, many of the most well established magazine publishers began to divest its fiction magazines by the early 1950s. Looking at Figure 2, we observe for example, the markets for crime fiction, westerns, and to a lesser extent science fiction essentially bottomed out by the early 1960s. As the locus of fiction consumption gradually shifted gradually from magazines and other periodicals to books, we expect:

Hypothesis 4 (1923-1973): *An increase in total US book consumption as a percentage of total recreational spending negatively influenced foundings of new SF magazines.*

2.4. Alternative Explanations

The above emphasis on legitimacy and competition corresponds closely with early formulations of organizational ecology (see, for example, Hannan and Freeman, 1987; Carroll and Hannan, 1989). Organizational ecologists have argued that at the population level, the total number of organizations (density) of a particular form drives both legitimation and competition. As Carroll and Hannan note, “at low density, growth in numbers mainly legitimates a population and organizational form it uses. But when density is high relative to resources, increases in density mainly strengthen processes of competition” (1989: 525). This “density-dependent” model has proven to be robust across multiple organizational populations and national contexts. Such density-dependent effects

are commonly tested by regressing the density, modeling legitimacy, and the squared term, modeling competition, on particular organizational events like foundings or dissolutions. Conventionally, due to methodological problems of collinearity and additional theoretical concerns, the log of density is often preferred over the raw density per se. This is because legitimacy is theorized to increase in a non-additive manner—an additional organizational founding in an earlier period generates more legitimacy than a later founding after the form is already established. Thus, we predict:

Hypothesis 5 (1923-1973): *The log of SF magazine density magazines is positively associated with new foundings, while the squared term is negatively associated with foundings.*

Since Peterson and Berger (1975), sociologists have used industrial economics and economic sociology more generally to explain patterns in cultural production. The basic intuition is that cultural or symbolic goods like music, movies, or books like any industrial good are shaped predominantly by the industrial organization of their production and resultant market pressures. Perhaps the most famous finding is that many cultural markets, most notably the US pop music market, alternate between periods of high industry concentration and high competition. In times of high concentration a few producers monopolize most of the production and distribution of cultural, while in periods of high competition small entrepreneurial firms often outperform established incumbents through pioneering new cultural forms that challenge or subvert the status quo. Thus, we expect:

Hypothesis 6 (1923-1973): *Higher market concentration decreases competitive entry and therefore, depresses foundings of new magazines.*

3. Data and Methods

The empirical contribution of the paper models event-counts of genre science fiction magazine production. Event-count dependent variables such as the number of wars, car accidents, or in my case, magazine foundings, require special estimators that model data from a discrete, non-negative distribution. Poisson and negative binomial regression models are conventionally used in such situations (Cameron and Triverdi, 1998). Like any regression model, key assumptions of event-count models largely guide the model selection and specification process. With Poisson models, the conditional mean is assumed to equal the conditional variance, known as the “equidispersion” property of the Poisson distribution. For many kinds of data, this assumption is violated empirically, leading to “overdispersion”. In such cases, a negative binomial model (a generalization of the Poisson model, which includes an additional parameter allowing the variance to vary independently from the mean) is understood as more appropriate. To test for overdispersion, one can fit a negative binomial model and compare its variance function with that of the Poisson model (Cameron and Triverdi, 2010: 575)—a significant difference indicating overdispersion. The nbreg command in STATA 11 performs a similar test by calculating the dispersion parameter. If the parameter is not significantly different from 0 (i.e. equidispersion), STATA fits a Poisson model instead, improving model fit and overall efficiency. Ultimately, all four models presented below were fitted using a negative binomial model.

Another problem concerns the time-series structure of the data. Past values of the dependent variable are often highly correlated with present values, known as autocorrelation, which in turn downwardly bias standard errors. A number of tests are

helpful in monitoring this problem. A Ljung-Box Q test on magazine foundings ($Q=32.6$, $p(\chi^2)=.08$) is not significant at the 95% level, suggesting that autocorrelation may not be driving the results.³

Table 1 about here

Operationalizations and data sources for the predictors are described more in detail in Table A1. All variables were measured and aggregated at the country-year level (US only) and lagged by one year; descriptive statistics and pairwise correlations are provided in Table 1. Of note, the popularity of science in all its multidimensionality could be measured several ways. For our purposes here, I used annual counts of New York Times articles that referenced the word, “science”. The wide national coverage of the “paper of record” and large annual counts, I argue, give some indication of the wider popularity of science. Other measures such as the number of PhDs graduating by field or patents differed little from a linear time trend and arguably do not address the wider popularity of science like the newspaper measure.

Since some of hypotheses predict period-specific effects, my model needs to take time into account in a meaningful way. A common analytic strategy would be to periodize the analysis, running separate regressions for different periods at identified breakpoints (see Isaac and Griffin 1989). Because of my small sample size (51 observations), decomposing the time-series analysis into smaller sub-samples might create model instability and a general skepticism concerning the results. Since only two of my hypotheses (the popularity of science and co-authorship networks) are expected to differ

³ Additional analyses (available upon request) used a lagged dependent variable, another conventional method of handling autocorrelation issues, with little to no substantive change in the results.

depending on the period, I decided to opt for a simpler piecewise exponential model where hypothesized period effects are tested by interacting hypothesized predictors with a period dummy variable. Thus, the period-specific effect can be assessed, net of a main period effect, through a simple interaction, saving considerable degree of freedom and improving statistical power. Beyond a main period effect, my only control of note is a magazine consumption measure similar to the book consumption measure—the limited number of observation again suggests more parsimonious models.

4. Results

Table 3 about here

Table 3 presents the results of our event count models of SF magazine foundings across four specifications: model 1 includes only the main predictors of interest derived from Baumann (2007), model 2 introduces the period interactions, and models 3 and 4 independently test the alternative explanations. With model 1 we find support for the book consumption hypothesis and the period 2 dummy variable. As predicted, book consumption appears to have negatively influenced foundings consistent with the shifting locus of the genre from magazines to paperback books. Surprisingly, neither popular science, nor the network measures appear to affect foundings in this model specification. As we add in period interactions in model 2, the model parameters predicted to vary across periods are indeed not temporally stable. This addition of period interactions results in a significant improvement in model fit, according to a simple likelihood ratio test ($\chi^2(2) = 7.30, p(\chi^2) = .02$). Thus, the results from model 2 suggest the legitimating ideology of popular science positively influenced magazine foundings in the first period (1923-1945), but not in the second (1946-1973) according to the negative, but not significant interaction

term. The estimated influence of popular science on foundings is quite sizeable—net of other predictors, an additional thousand articles increased foundings 2.73 times ($\exp(1.006)=2.73$). Networks among authors measured by the co-authorship rate, moreover, influenced foundings only in the second period (1946-1973) as indicated by the significant, positive interaction term. Thus, co-author networks only appear to matter as they expanded in both size and cohesiveness in the post-War period. Moving to opportunity space predictors, we observe that that book consumption is still negative, but no longer significant once we take into account period interactions. Surprisingly, given the close connection between crime fiction and science fiction, especially at the production stage, foundings of crime magazines appear to have no effect on SF magazine foundings. This hypothesized relationship worked on the assumption that both genres competed for similar sorts of fans. The results, however, suggest that resource-partitioning occurred between the genres—science fiction attracted a different kind of consumer from that of crime fiction, avoiding direct competition over fans (whether this was purposeful or accidental is another question). Our magazine consumption control becomes both positive and significant in model 2, suggesting that SF magazines benefited from the wider established legitimacy of fiction magazines in general. Since SF emerged later than other genres, new SF magazines already enjoyed a national market for similar goods and distribution systems that afforded wide circulation even for upstart magazines. Finally, the main effect of period 2 becomes no longer significant in model 2 once we include period interactions. Of note, the results suggest a sequential story underlying the trajectory of American science fiction magazines—a finding made possible by taking time seriously in my analysis. Detecting such sequential effects casts considerable doubt on the common

assumption of “ahistorical time” in quantitative historical analysis, which model time as “qualitatively undifferentiated... a smooth homogenous magnitude viewed as external to the events and relationships of history, except as an index of chronology” (Isaac and Griffin, 1989: 876).

Moving to alternative explanations in models 3 and 4, we find that many of the results of model 2 not only stay significant (most notably popular science and network measures), but that the coefficients themselves remain largely stable, suggesting that these alternative explanations capture little to no additional variation. In model 3, both the log of magazine density and the squared term point opposite their hypothesized directions, yet remain insignificant. Since I am already modeling aspects of both legitimization and competition, the result is not entirely surprising. The market concentration measure in model 4 is indeed negatively associated with foundings, but is again not significant.

5. Discussion and Conclusion

The above empirical exercise confirms the basic utility of Baumann’s framework for modeling the trajectories of genres through time. Importantly, the three processes elaborated above—legitimizing ideology, institutionalized resources, and opportunity space—are hypothesized to work for both popular and high cultural forms. One might imagine similar research projects, which model others genres through time—the generality of Baumann’s processes make their application possible across multiple cultural domains beyond literary genres. The primary assumption throughout is that genre trajectories are theorized and modeled as a function of their wider legitimacy—the coin of the artistic realm, according to Bourdieu. Though legitimacy is commonly theorized as “another kind of resource that organizations extract from their institutional environments”, it may be

better understood as a largely intangible “symbolic value...visible to outsiders” (Scott, 2008: 59-60). As such, legitimacy may not map neatly onto other key organizational events such as foundings used here as a proxy for genre trajectory, nor be succinctly modeled in predictable ways. Similar to the convention of using the log of density to model the theorized, non-additive nature of legitimacy, our predictors of artistic legitimacy might find larger, significant effects in an earlier period and little in the way of additional effects in subsequent time periods even as the genre keeps expanding or differentiating. This suggests that if the goal of the paper is to explain the genre trajectory of science fiction or any other genre for that matter, then an additional set of predictors, modeling other dynamics, might be required after a genre has achieved a taken-for-granted status. The problem elaborated here is not simply one of extra variables, but rather additional levels of analysis. Such a coherent framework that models entire life courses of genres—a true dynamic theory of classification systems—is still forthcoming.

The recent work of Lena and Peterson (2008) holds some useful suggestions for such a theory. Analyzing the life histories of sixty musical genres, they identified a typical trajectory that fit nearly two-thirds of their cases. Genres along this trajectory emerged first from a small avant-garde network of producers, then moved to a place-based musical scene, and finally became an industry-based genre, as record companies promoted the music to a more general audience. A handful of the oldest genres (16) then made the transition finally to a traditionalist genre, becoming a widely taken-for-granted category worthy of cultural preservation and heritage even as few original performers continued to play the music. If genres across time really do move between such social contexts and levels of analysis (from small networks to organized industrial forms to taken-for-granted

traditions), this suggests modeling genres through time using different sets of predictors based on its location along a wider, ideal-typical genre trajectory. For my purposes, here I made no attempt to translate Lena and Peterson's typology into testable predictions, but the history of science fiction and my empirical results suggest a somewhat consistent account. We might say similarly science fiction genre emerged first from industry (via established pulp magazine editors like Gernsback), moved subsequently to a defined literary scene or art world (networks of authors and fans often geographically proximate) to becoming, ironically, traditionalist—a strongly taken-for-granted category in cultural production and consumption (most bookstores have a “science fiction/fantasy” section). Additional studies of genre trajectories might then take up such a challenge, identifying first the successive stages in a genre's life history and then proceeding to model it as such.

Finally, the above results show tremendous promise for situating a portion of the artistic legitimization process on the boundaries between fields, rather than solely within a particular field (see, for example, Evans and Kay, 2008)—namely, I argued that science fiction purposefully drew upon the wider legitimacy of popular science to carve out a unique and recognized discursive space of its own. In time, as my findings suggest, the two fields decoupled, as science fiction purged itself of both the earlier pedagogical aspirations of Gernsback or the accurate science of the Golden Age and oriented itself more in line with contemporary fiction writing. Understandably, this cleavage remains incomplete—a considerable amount of SF continues to draw upon the latest science in accurate, thoughtful ways. Intense sub-genre differentiation, however, within science fiction helped create smaller, specialized discursive spaces for this earlier tradition, rather than maintain and enforce some general expectation of accurate science across the majority of SF. In the

same period we observe SF decoupling from popular science, the sub-genre “hard science fiction” emerged, promising the kind of story that a SF reviewer from 1962 lamented, “many scientists and engineers are thinking of when they complain that the current brand [of SF] is no good, or isn’t even science fiction” (quoted in Westfahl, 1996: 18). Today, the most popular science fiction writers are those often associated with this hard SF tradition (Isaac Asimov, Robert Heinlein, Arthur C. Clarke), while the most critically acclaimed authors distance themselves from this particular sub-genre and often science altogether (recent Nobel Prize winner, Doris Lessing, quoted above, is a wonderful example of this, other might include J.G. Ballard, Kurt Vonnegut, Thomas M. Disch). The sequential story elaborated above suggests an explanation for this puzzle: the use of popular science as a legitimating ideology for the lowbrow pulp genre during its formative period (1923-1945) imprinted an association of lower status onto works that openly embraced science, continuing even into the present, while those writers who worked outside of this framework receive none of the status penalties. Additional studies of genre trajectories and perhaps categories in general would do well to identify similar field overlaps and their sequential interlocking, which power the wide diffusion and acceptance of nascent categories.

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David Reinecke is currently a doctoral student in sociology at Princeton University. To paraphrase noted physicist Freeman Dyson, historical sociology is his territory, but science fiction remains the landscape of his dreams, or something like that.

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	Mean	S.D.	Min	Max	1	2	3	4	5	6	7	8	9	10
1 SF Foundings	3.29	3.4	0	16	1									
2 NYT Science/1000	2.21	0.67	0.79	3.61	0.36	1								
3 Magazine Consumption	13.48	2.55	9.2	19.23	-0.12	-0.36	1							
4 Book Consumption	6.78	1.03	5.26	9.26	-0.35	-0.46	0.59	1						
5 Crime Foundings	4.39	4.21	0	14	0.01	0.24	0.47	0.16	1					
6 Co-Authorship Rate	2.86	1.44	0	6.99	0.2	0.29	-0.62	-0.39	-0.23	1				
7 Period 2	0.52	0.5	0	1	0.3	0.37	-0.74	-0.66	-0.4	0.43	1			
8 Log of SF Density	2.44	0.92	0	3.64	0.54	0.39	-0.36	-0.48	0.12	0.27	0.58	1		
9 Density2/100	3.16	3.35	0	14.44	0.75	0.14	-0.32	-0.37	-0.11	0.34	0.52	0.71	1	
10 Market Concentration	14.63	23.15	0	100	-0.35	-0.37	0.24	0.31	-0.23	-0.06	-0.41	-0.8	-0.4	1

Table 1: Descriptive statistics and pairwise correlations

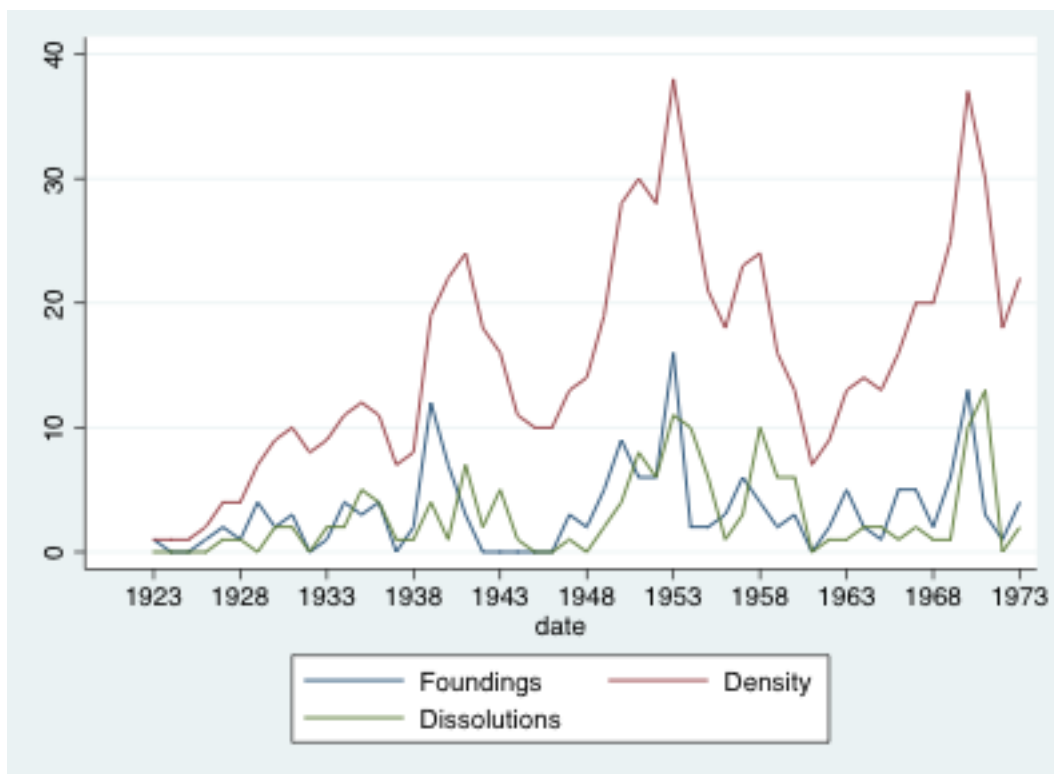


Figure 1: Science-Fiction Magazines (1923-1973, US only)

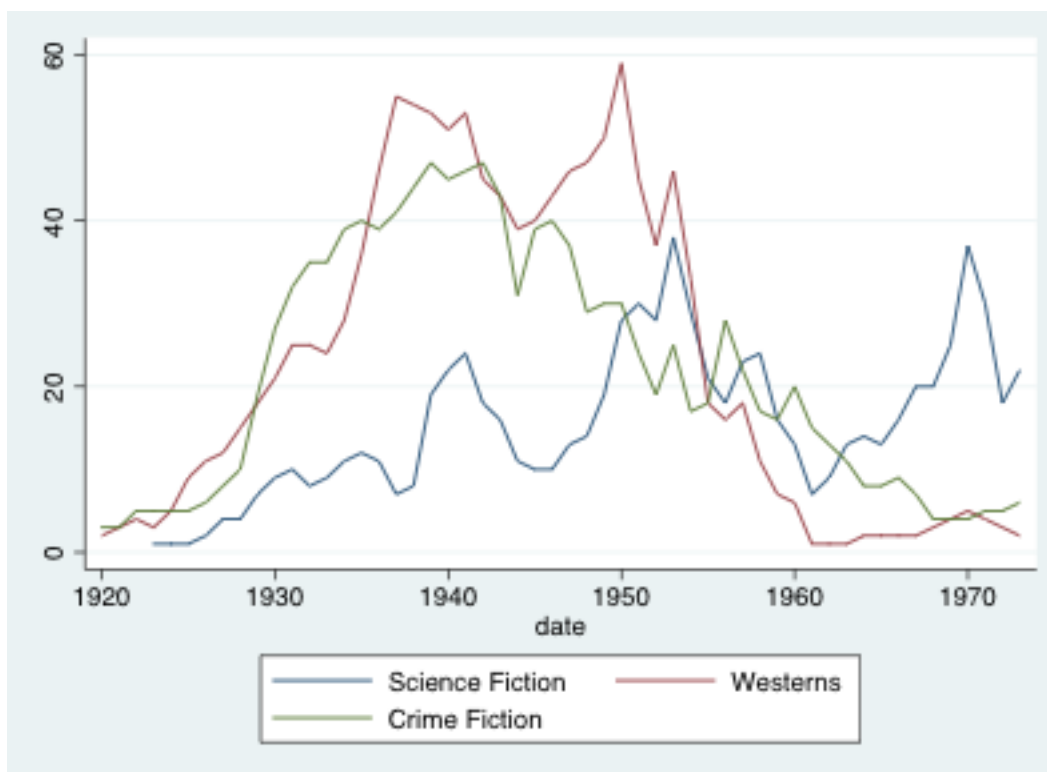


Figure 2: Magazine Density by Genre (1920-1973, US only)

Co-authorship network in three periods

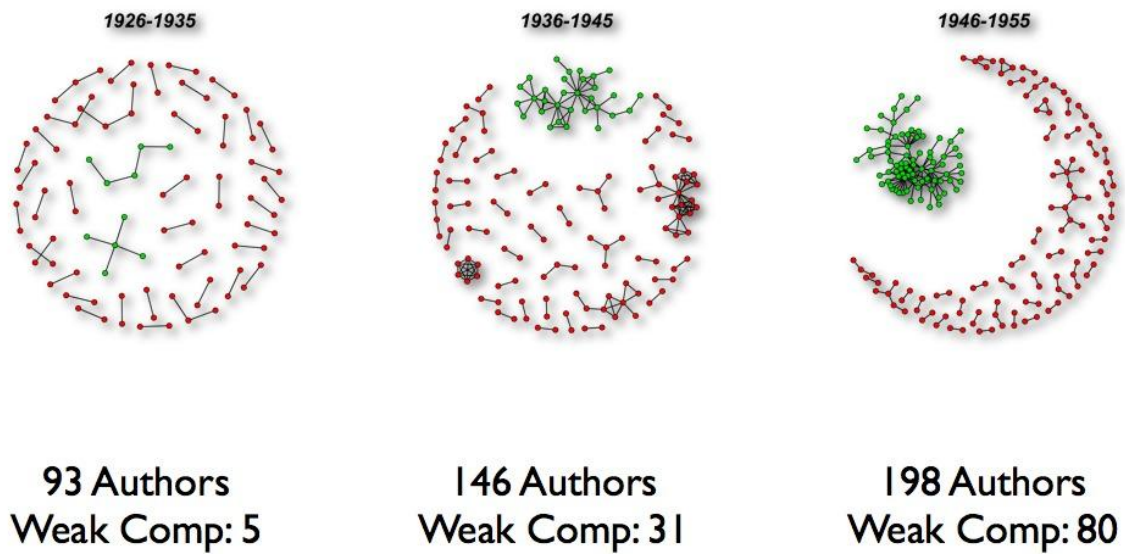


Figure 3: Co-Authorship Network in Three Periods

Table 3: Event Count Models of Science-Fiction Magazine Foundings

	(1)	(2)	(3)	(4)
NYT Science/1,000	0.308 (0.243)	1.006** (0.433)	1.085** (0.465)	0.960** (0.448)
Book Consumption	-0.434** (0.177)	-0.237 (0.189)	-0.252 (0.193)	-0.236 (0.189)
Crime Foundings	0.0294 (0.0393)	0.0160 (0.0390)	0.0243 (0.0421)	0.0107 (0.0414)
Co-Authorship Rate	0.184 (0.146)	0.109 (0.142)	0.124 (0.152)	0.109 (0.142)
Magazine Consumption	0.141 (0.0914)	0.187** (0.0937)	0.204** (0.102)	0.183* (0.0941)
Period 2 (1946-1973)	0.690* (0.375)	1.432 (1.444)	1.662 (1.522)	1.289 (1.488)
NYT Science x Period 2		-0.675 (0.526)	-0.734 (0.545)	-0.632 (0.537)
Co-Authorship x Period 2		0.315** (0.156)	0.343** (0.166)	0.302* (0.159)
Log of Density			-0.173 (0.346)	
Density ² /1,000			0.116 (0.596)	
Market Concentration				-0.00380 (0.0103)
Constant	0.320 (2.118)	-3.081 (2.386)	-3.188 (2.461)	-2.805 (2.481)
Period	1923-1973	1923-1973	1923-1973	1923-1973
Pseudo-R2	0.0733	0.104	0.105	0.105
Log Likelihood	-109.5	-105.9	-105.7	-105.8

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1 (two-tailed tests)

Appendix A: Constructing the Science Fiction Magazine Series

When collecting data on populations of organizations boundary issues often complicate data collection. In my case, what counts as a science fiction magazine? For my purposes here, I deferred largely to the efforts of fans and fan historians to help select magazines for inclusion—an appropriate strategy given the emphasis on measuring the trajectory of genre science fiction, which is defined largely through fan practice and consumption. I relied heavily upon fan indices (Tymn and Ashley 1985; Murray 1999; Miller and Contento 2008) and Ashley’s magisterial three-volume history (2000; 2005; 2007), which covers the period from around 1920 to 1980. If a magazine appears in more than two sources, I included the magazine in the dataset. When we adopt such selection criteria, however, what counts as science fiction, according to fan standards, extends well beyond typical expectations to include associated genres like fantasy, horror, and weird fiction. Reading through these magazines we find, as Hirsch (1958: 507) did, that most magazines rarely observed such distinctions and the inclusion of these genres reflect, if anything, the varied quality of much science fiction. In total, my dataset includes 168 magazines in the 51-year period of observation. A magazine is considered active in a given year if it publishes a single issue in that year. Many magazines constantly shifted names across the period of observation with little change in either the editorial staff or content. Thus, in keeping with magazine index conventions, renamed magazines are coded as a continuation of the early magazine, rather than as a unique magazine keeping with conventions in fan indices. Sometimes, a magazine will disappear for several years only to reappear under the same name, but a different publishing house and editorial staff—I consider these cases as a new instance of a magazine if they been out of publication for three or more years. For all

magazines, I collected founding and dissolution dates down to month when possible or quarter year. Data on publishing house, editors, published stories, and authors were collected as well.

Table A1: Definitions and Data Sources for Predictors

Legitimizing Ideology

“NYT Science/1,000”: Annual counts of New York Times articles that contain the word, “science” divided by 1,000; queried from ProQuest Historical Newspapers.

Institutionalized Resources

“Co-Authorship Rate”: Total co-authored stories/total stories published in all SF magazines times 100; queried from the Internet Speculative Fiction Database at www.isfdb.org, accessed April 10, 2011.

Opportunity Space

“Book Consumption”: Total US consumer expenditure on books and maps/Total US consumer recreational expenditure times 100; constructed from Series Cd 1-77; 153-263 from the *Historical Statistics of the United States* (2000).

“Crime Foundings”: Annual count of crime, mystery, and gangster fiction magazine foundings (1920-1923) constructed from Galactic Central’s online checklist of crime fiction magazines at http://www.philsp.com/lists/m_magazines.html, accessed April 10, 2011.

Alternative Explanations

“Log of Density”: Natural log of science fiction magazine density; constructed from SF magazine series described in Appendix A.

“Market Concentration”: Herfindahl-Hirschman Index of industry concentration scaled from 0 to 100, constructed from SF magazine series described in Appendix A.

Controls

“Period 2”: Dummy variable for years, 1946-1973.

“Magazine Consumption”: Total US consumer expenditure on magazines and periodicals/Total US consumer recreational expenditure times 100; constructed from Series Cd 1-77; 153-263 from the *Historical Statistics of the United States* (2000).